

光电信息获取与处理

利用AOTF多光谱成像系统实现伪装目标的识别

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摘要:

针对传统分光器件存在移动部件以及不能快速实时选择波长的不足,搭建了用声光可调滤光器(AOTF)作为分光器件的多光谱成像系统。系统由光学镜头、AOTF、AOTF驱动器、CCD摄像机和图像采集系统组成。本系统能够在(500~1000)nm的光谱范围内成像。通过对AOTF的控制可以任意选择系统的光谱,从而有目的地选择具有典型目标特性的不同波段的光谱波长,形成同一目标在不同光谱波长下的不同图像。采用迷彩布、头盔以及自然花草进行多次目标特性识别试验,得到了能突出目标特性的具有典型光谱特性的图像。证实了基于AOTF的多光谱成像系统灵敏度高、体积小、无移动部件,并且能够快速实时地改变和选择光谱波段,在所成的多光谱图像中能提高目标与背景的对比度,对伪装目标有明显的探测和识别能力,能将伪装目标与背景区分开。

关键词: 多光谱成像 AOTF 目标特性 伪装目标 探测和识别

Camouflaged target recognition realized by AOTF multispectral imaging system

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Abstract:

The multispectral imaging system taking an acousto-optic tunable filter (AOTF) as the spectrometer is proposed to overcome the weak points of the traditional spectrometers which have some moving parts and can not perform the real-time wavelength selection. The system is composed of lens, AOTF, AOTF driver, CCD camera and image acquisition unit, and can obtain images in the spectral range of 500nm~1000nm. The spectrum is selected at random by controlling the AOTF, thus the wavelengths at different bands that have typical target characteristics are purposefully chosen, and the different images for the same targets are acquired at different wavelengths. Several tests for the recognition of the target characteristics were performed in lab and field environment with camouflage pattern, helmet and plants. Reflectance characteristics of objects were obtained at different spectral bands, and images of the discriminating targets were acquired from their backgrounds. The experiments confirm that the multispectral imaging system based on AOTF can change and select the spectral band quickly in real time, it has the ability of detecting and recognizing camouflaged targets, and can discriminate the camouflaged targets from backgrounds. Moreover, the system has many merits, such as compact and high-speed spectral sensitivity as well as without moving parts.

Keywords: multispectral imaging AOTF target property camouflaged target detection and identification

收稿日期 修回日期 网络版发布日期

DOI:

基金项目:

扩展功能

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